

C *Flying* CADET

10¢

JANUARY, 1943



THEORETICAL

INVASION OF AMERICA

FLOATING BAMBOO AIRFIELDS
AIR CADET, U.S.N. HOW TO FLY





THE NEW TECHNIQUE OF

BOMBARDMENT

*U. S. Air Force Introduces New Style in
Daytime, Precision Assaults over Europe*

MODERN air forces of the world are organized chiefly as offensive weapons. And day by day, as the American Air Force and the R.A.F. hammer away in their aerial offensive, it becomes increasingly evident that at the core of airpower is the bomber. As a flying fortress, the bomber rivals the destructiveness of the long range rifle and gives, in addition, the great added advantage of mobility and range.

Through aerial bombardment's few short years of development, there have emerged three distinct types of bombing: dive bombing, horizontal bombing and torpedo bombing. So exact a science has aerial attack become that for every kind of military objective, there is a special plane, a definite type of bomb and a precise method of deployment and attack.

Dive bombing is by far the most spectacular method of air attack. First invented by U. S. Navy pilots in the 1920's, it became the ace-up-the-sleeve of the Luftwaffe and paved the way for the Panzer Division's steamroller march into a dozen nations.

Dive bombers, however, are successful—to the point where they can decide a battle—only when there is no aerial opposition. The proof for this statement is found in the stand of England through the devastating raids of 1940 and in Russia's successful answer to the "Stuka" today. Even mediocre aircraft opposition can completely thwart the dive bomber because much of the dive bomber's defensive ability—speed, armor and firepower

—has been sacrificed in the design of the plane itself.

The German dive bomber was most successful when used as a cooperating arm of land forces, as in France, Belgium, Holland, Poland and Norway, and was terribly effective but least decisive when striking out alone and over water as at the cities and towns of England.

Today, the United States, England and Russia are developing a method of attack unlike that which failed for the Germans. By massing and concentrating great bombing armadas, the Allies have effected with success the complete obliteration of whole areas of military or industrial importance.



ARMY BOMBARDIERS
use this practice high-chair in their preliminary studies of the bombsight.

This is the slow process of attrition. Attrition cannot win a war alone but can contribute heavily to the decision by eating into and wearing away the resources and the industrial reserve of the enemy.

Let's look at the aerial offensive over Europe that is being waged by the R.A.F. and the American A. F. against the holding air forces of Germany and its ground defenses. The first thing we see is that the two air forces, the R.A.F. and the A.A.F., have common objectives but tactics or techniques that are totally dissimilar.

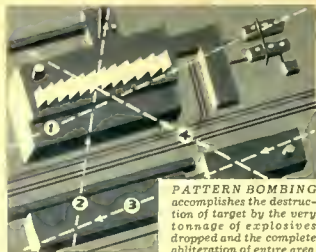
The technique of the R.A.F. and the A.A.F. are peculiar to the situation in which the United Nations find themselves, at the moment, on the European air front. To strike at the military and industrial heart which keeps the Axis forces alive, it is necessary for the attacking air force to fly great distances bristling with a thoroughly developed defensive and interception network.

Daylight penetration of this buffer area by R.A.F. bombing missions without fighter protection proved too costly in men and machines lost, yet the distance across the buffer and back to its base in England is greater than the range of the fast, escorting fighter plane.

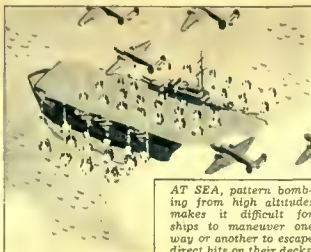
The R.A.F., therefore, has developed to a point of high efficiency the technique of mass bombing attack under the cover and protection of darkness. Its planes have been built and its men have been trained for this method of attack.



NIGHT ATTACKS like this one are staged by the R.A.F. for mass destruction. The drawing above shows an attack plan and location of each flight at 10:30 P.M. Times shown next to each group indicate the hour at which it arrived over target area. The raid lasted from 8:00 P.M. to 3:00 A.M.



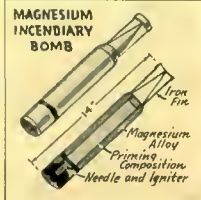
PATTERN BOMBING accomplishes the destruction of target by the very tonnage of explosives dropped and the complete annihilation of entire area.



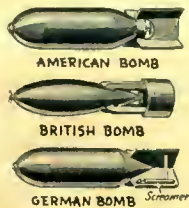
AT SEA, pattern bombing from high altitudes makes it difficult for ships to maneuver one way or another to escape direct hits on their decks.



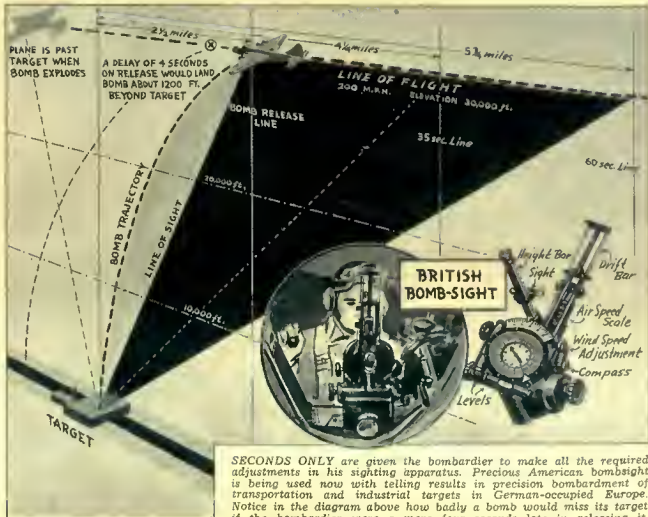
RUSSIAN INVENTIVE SKILL is responsible for many of the developments in employment of military aviation, among which may be this combination incendiary and high explosive bomb, perfected and used effectively by the Germans.



GREATEST FAILURE is that of bomb most dreaded before war's outbreak. Magnesium incendiaries created terrible destruction but failed to win decision in mission over England. Important military targets are today prepared for the incendiary, now best used to fire targets after high explosives have demoralized them.



CHARACTERISTICS of bombs used by Axis and United Nations.



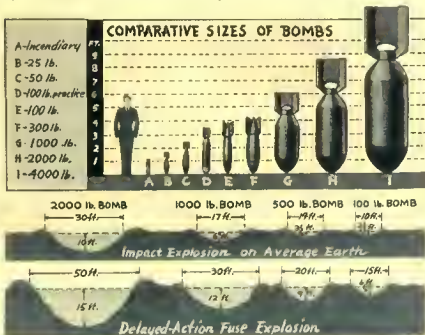
SECONDS ONLY are given the bombardier to make all the required adjustments in his sighting apparatus. Precious American bombsight is being used now with telling results in precision bombardment of transportation and industrial targets in German-occupied Europe. Notice in the diagram above how badly a bomb would miss its target if the bombardier were a mere four seconds late in releasing it.

When applied to this method of attack, all of the fine-point training of our airmen and most of the instruments and features of our bombing aircraft are wasted—for the American technique of heavy bombardment has been out-in-the-open, high-altitude, precision, daylight attack. Our planes have been built for it. Our men have been trained for it. Our thinking runs along that line.

Dive bombing has been called point blank bombing because of the range at which the missile is released and because the direction and speed of the bomber are used to direct the bomb.

Another type of point blank bombing that has proved highly successful is torpedo bombing. Fully 70 percent of all naval losses in this war are attributed to the low-flying torpedo plane which crashes its lethal loads into its target at short ranges.

The torpedo plane approaches





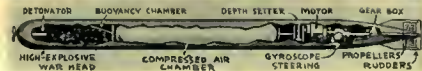
MOST SUCCESSFUL modern instrument of naval warfare is the plane-launched torpedo which already has accounted for many warships. Aircraft torpedoes usually are somewhat smaller in size.

its target at a respectably safe altitude. When the course and position of the target vessel have been determined the torpedo plane descends to within a hundred feet of the surface and begins its dodging run-in. The last part of the run is straightened out with the torpedo plane headed directly at the target, less than fifty feet above the surface.

The torpedo is an intricate, self-propelled mechanism containing one or two engines and many delicate working parts. It must slide into the water gently in order to avoid damage to its innards.

The attacking plane attempts to direct its torpedo at the vitals of the target vessel. The torpedo does not penetrate but explodes on contact, about ten feet below the surface, with such terrific violence that even the heaviest clad ships are stove in by the tremendous and instantaneous increase in water pressure.

A technique has been developed for plane-borne torpedo attacks and not one or two but many planes are employed if the target is sufficiently important. The attacking force is composed of escorting fighters and bombers, using both fragmentation and demolition bombs to clear away as many anti-aircraft deck installations as possible. The actual attack of the torpedo planes is preceded by fast-flying planes known as smokers which lay a course close and parallel to the target vessel. A thick smoke-



screen is put down and hides the torpedo planes until they are within several hundred yards of their target. Then the torpedo planes attack—as many as six, twelve or eighteen of them, bent on the destruction of a single ship.

The final types of bombardment, attack bombing and pattern bombing, are variations of horizontal bombing.

Attack bombing is low-altitude bombing and strafing attacks on troops and supply columns. The distance between the objective and the plane in this case is so small that the bomb sights are useless. A simple protractor or the bombardier's sense of timing is sufficient.

The low-altitude bomber has little to fear from ground defenses, for his attack is sudden and surprising and he remains within the arc of anti-aircraft fire for only a few seconds. He may protect himself even further by using the irregularities of the ground to make it difficult for defending forces to anticipate his arrival, swooping down on them from around a hill.

The classic example of pattern bombing is the Luftwaffe's 1940 attacks on London. Day after day huge squadrons filled the sky. First, light bombers dropped fire bombs to act as beacons for the bigger bombers which were to follow. Then wave after wave of giant bombers criss-crossed over the fire-marked city, unloading many tons of bombs in hailstone fashion.





SALVO BOMBARDMENT gets results because it spreads bursts over a wide area, boxing its target. A bomb need not make a direct hit on a submarine, as a near miss will increase water pressure so violently that it will open submarine's thin side plates.



BOMBS IN A STICK explode in a direct line. This method of bomb release is used where the target is of a shape requiring "straddling," which is like the crossing of a straight line to make an X. Usually, one bomb of the stick will then score a direct hit.



PROMISE OF ACTION attracts cream of American manhood to flight training enrollment offices. Uncle Sam welcomes young men between 18 and 27.



EACH APPLICANT is given an intelligence and mechanical aptitude test which he must pass with an above-average grade before he can be enrolled.

FLYING CADET, U.S.N.

WHEN Flying Cadets complete the Navy's eleven month regulation flying course and win their Navy Wings, they are convinced they are the best fighting pilots in the world. Military experts are inclined to agree.

So you want to be a Navy Flying Officer! Here's what you can expect. Once you've taken your oath and report for duty you will embark on the stiffest course you've ever taken. It has to be stiff, because it has to make you better than any Jap or Nazi fighter. It has to drill coordination, aggressiveness, confidence and alertness into you until all

your actions in a plane become instinctive and mere mechanical processes.

Your first hurdle will be pre-flight school. Cadets from the East are sent to Chapel Hill, at the University of North Carolina; from the Mid-West to the University of Iowa; from the South to the University of Georgia; and from the West to St. Mary's College in California.

For three months, phonographs will pound Morse code into your ears. You will study navigation in planetariums and discover all the intricacies of charts and compasses. You will learn how to

take sights in any weather. There will be classes in mathematics, radio, mechanics, physics, navigation and aerial observation.

But during these preliminary three months, physical conditioning and drilling are the most important considerations. For almost four hours every day you will play at the kind of sports where many players are needed, to breed in you a permanent adaptability and desire for team work. There will also be calisthenics, body-building exercises, woodchopping, swimming and jiu-jitsu. You'll also become well versed in the manual of arms.



APPLICANTS are sworn into the Navy for a year's course as flying cadets after they have successfully completed a series of rigid physical examinations.



REGIMENTAL HEADQUARTERS enter the newly enrolled cadet's picture in a quick, visual reference file, like this one at Corpus Christi Air Station.



NAVY MEN must be able to identify planes at a glance. They learn this by watching models travel on a trolley back and forth around their classroom.



EVERY VARIATION in the hum of the running airplane engine must be recognized by the flying cadet. For this reason, he studies power plant operations.



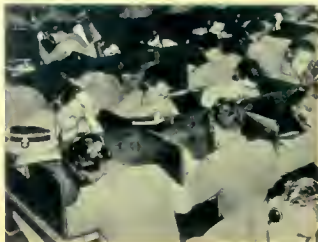
THE LIFE OF A CADET is devoted chiefly to studies, to make him one of the world's best-trained pilots—but there are hours given over to relaxation.



MODELS are used for range estimation and gunnery training. Through a gunsight at 10 feet, a wooden model looks like a real plane 240 feet away.



INSIDE THE ENGINE, the cadets here watch the action that drives the airplane. The photograph shows an engine cut in half to reveal its working parts.



COMMUNICATIONS are an important part in the studies of the flying cadet. Navigation and meteorology are other subjects requiring hours of book work.



BOMBS AND TORPEDOES are the offensive weapons of naval aviation. The construction of a bomb and bombardment theory is here explained to cadets.



AFTER MASTERING the feel of an airplane, cadets must learn to fly by instruments. Photograph above shows the Link Trainer and, at his control desk, the instructor who follows the "course" of his ship.

You'll handle pistols, rifles and machine guns until you can handle them like an expert. And during all this time you will receive \$75 a month.

From pre-flight school, cadets are sent to one of 23 Naval Reserve Aviation Bases for preliminary flight instructions. Here the Navy will apply its famous teaching formula: "The way to learn how to fly is to fly, and the place to fly is in the air."

At these Reserve bases you will use all the elementary knowledge you obtained at the pre-flight training school. Though the day's schedule will be much the same as your first three months, there will be instruction in tactics and strategy, aerology, dead reckoning navigation, advanced radio, photography and gunnery. And here your actual flying begins.

North American or Stearman Trainers will be your first taste of Naval flying. Instructors will show you what flying is all about before you take over the controls. Then you will be assigned to regular flying schedules. In general, half your day will be spent in ground school and the other half in the air. One day your instructor will casually say "O.K. take her up." That will be your first solo.

During these three months you will have accumulated 72 hours of dual control flying and will have had a good taste of acrobatics. From here, if your academic and flying examinations show you have flying sense and

(Continued on page 58)



FAMOUS TEACHING FORMULA of the Navy is "the way to learn how to fly is to fly and the place to fly is in the air." In the photograph above, a Navy primary bi-plane trainer is warming up for the take-off. The instructor, his arm raised as a signal, is in the front cockpit. Student, behind him, has dual controls.



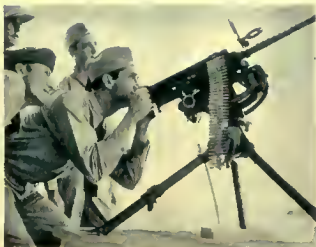
INSTRUCTOR gives last-minute advice to student before all-important take-off on first solo. The Navy "washes-out" candidates who are unable to qualify.



GOOD-NATURED RITUAL at a training center is to give a cadet a dunking when he has successfully completed his first solo as he poses for photograph.



SKEET-SHOOTING trains the flying cadet to shoot fast and to lead his target. Fast shooting is important where guns bear on their target for only a second.



APPLICATION of the same principles that run up a good score in skeet-shooting result in bulls'-eyes for cadet when he advances to practice with machine guns.



HIGH ALTITUDES impose hardships which every cadet must prove himself capable of mastering. Above, cadets are going through a recognition examination under conditions like those faced at 25,000 feet.



A NAVY DOCTOR watches through a window in the pressure tank for the first signs of fatigue or distress.



PARACHUTE PACKING is just one more thing that flying cadets must learn to do perfectly in their year-long training course, before they are qualified.



HOW TO JUMP, how to steer a parachute, and how to fall—on land or in the water—these are a few of the things which prepare a cadet for any emergency.



TEAMWORK is the keynote of Navy aviation. There are no lone wolves. Navy airmen are taught to co-ordinate their movements with all their teammates.



DAWN finds these future Navy cadets ready to take off. From the air they will be taught all of the fine points of scouting and search, bombing and gunnery.



NAVY AVIATION TRAINING is divided into four steps. Pre-flight training is acquired at one of four universities. Primary training follows and is accompanied by the first taste of actual flight. Intermediate and advanced flight training acquaint cadet with operation of hotter, faster ships and test his navigation knowledge.



AN ICY chill clamped down on Joe's heart like a vise as he looked at the cluster of little dials—104 of them—on his instrument panel. He felt the tips of his fingers run cold in their gloves. His fear of those gadgets was unreasonable and he knew it.

Now alone and flying blind, their functions seemed as foreign as a swastika. The dimly lighted cockpit hung about him, damp and clammy. Mechanically, he switched on the transmitter.

"Hatch in flight one calling ground base for instructions."

He heard the cutting sound of static, like stones over rough sandpaper, then a thin voice crackling back to him.

"Instructor to Hatch in flight one. Instructor to Hatch in flight one. Give us your altitude, Hatch."

Joe's eyes strained towards the altimeter. "Altitude two thousand feet," he murmured.

Again the voice rasped over,

brittle and hard. "Okay Hatch, slow bank left and take it easy."

Joe pressed softly on the stick. The plane dipped early, but Joe knew that despite his intuition the panel was right.

"Bank right, increase speed to 210 m.p.h. and get altitude."

The words flooded the cockpit. Joe maneuvered the ship into a right bank, levelled off, stepped up his speed and started climbing.

The ship ripped through the sky like a sharp knife. He listened as it roared savagely at the wind. The steady hum of the motor loomed in front of him like a gigantic heartbeat. A frosty finger pressed against his lips, and Joe knew Death was plotting his course. He kept hearing the words "faster, Joe, faster."

The ground base came in again.

"Instructor to Hatch in flight one. Instructor to Hatch in flight one. Wake up Hatch! Cut your speed and level out. You're way off.

Give me your gas reading."

Joe shook his head and passed his gloved hand over a bead of sweat that escaped down to his chin. His voice was unsteady. "The gauge must be on the Fritz," he shouted. "It reads empty."

The answer flashed back like lightning. "You'll never land that ship. Bail out pronto—bail out!"

As the voice trailed away, Joe flung the hood open. Joe's head spun and his left arm shielded his eyes when he leaped, yelling.

It was ironic, he thought, to have no time to muse over his life—no quick kaleidoscope of youth, college days, girls, home. It seemed a second, maybe less, before his hurtling body passed from air to earth.

"Boy, are you off the beam!" gasped Joe's instructor. "First time I've ever seen anyone bail out of a four-foot Link trainer on his head. What would you do if you really were flying?"

AMERICA INVADED!

COASTAL DEFENSE TACTICS

GEOGRAPHICALLY, America's most vulnerable spot is Natal, Brazil, jutting out to within 1,800 miles of Axis-held Dakar, on the coast of Africa. Here is the story of an Axis attempt to invade Brazil, and counter-measures of defense. It is pure fancy.

FOR days great areas of the Atlantic had been lashed by storm. The surface had been hidden completely by low cloud banks and dirty weather. Not until the fifth day did the over-cast lift, gradually and grudgingly. But, by noon that day, the big PBY's of the coastal patrol were finally freed to resume their vigil over coastwise shipping and their constant search for marauding submarines.

It was one of those Consolidated flying boats that first sighted the oncoming invasion fleet, far out over the Atlantic.

It happened at 6 P. M., about 500 miles off Natal, Brazil. The PBY had been slicing its way through low-hanging clouds. Then the clouds fell away sharply and, the sea ahead and below was blue and sunlit. Every man in the crew gasped in surprise—not at the sea but at what rode on it. For, hardly fifteen miles away, a vast train of ships was visible, headed westward.

The pilot of the PBY slammed his boat back into the clouds, to escape detection. Thereafter, dodging in and out and far away, he made a complete reconnaissance. It was, actually, an enemy convoy. And the convoy was headed toward America—ship after ship after ship, led by a cruiser, protected on the flanks

by other cruisers and destroyers and trailed by two escorted carriers. There were nearly a hundred in all—transports, supply and auxiliary vessels—trailing out for miles.

The shocking news was flashed throughout North and South America in a matter of minutes. In Washington, the Army and Navy high command hurried into joint conference. At first there was doubt that the report could be true. Was it possible that Hitler could have gathered such a force without detection, even with the aid of bad weather? Could he have embarked such a mass of troops from Dakar or some other port, slipped his aircraft carriers out, through the North Sea and joined forces in a secret Atlantic rendezvous?

The British Admiralty was queried. The reply that came back was puzzling. Several weeks before, every ship berthed on the German and occupied coast had been covered by huge camouflage nets. The nets had been bombed away again and again but had been repaired. Photographic reconnaissance had noted nothing unusual. Perhaps the nets had remained while the ships had slipped away.

Brazil was at war with Germany. From the United States to the hump of Brazil to Africa

was the air route that our side was using to send supplies and aircraft to the armies in Egypt, Russia, India and China. Hitler had reason for wanting to grab the hump of Brazil. It was one way in which he could close the door on American supplies.

The threatened invasion of South America caught the United States off-guard. The Navy was unprepared. In surface vessels, its strength in the Atlantic had been divided and spread out over thousands of miles and was busily engaged on a score of missions and convoy duties. Only the new, fast aircraft carrier American Eagle and her destroyer escort were within striking distance of the invasion force. Word was flashed to the Eagle to intercept the enemy at any cost.

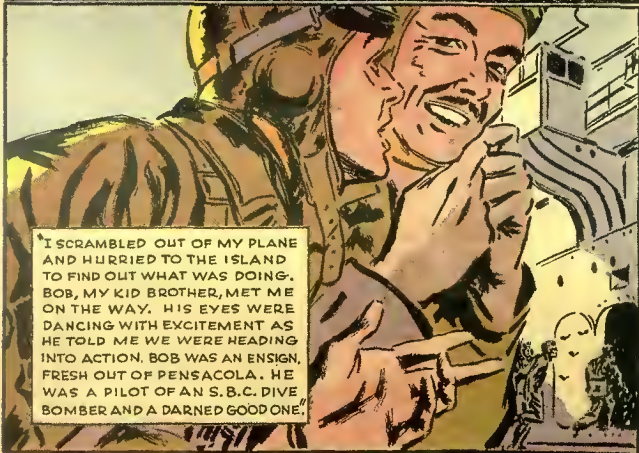
Tim Healy was a squadron leader assigned to the Eagle. He was in the thick of that bitter air-sea battle that followed. And no man is better able to tell the story of it—for Tim Healy watched as, one by one, his entire squadron of torpedo bombers was wiped out. He saw his own brother killed. Until the time came for him to drive his torpedo home, he had a bird's-eye view of the whole show from a grandstand seat in the clouds. On the following pages is his own account, told in his own words.

"MY SQUADRON OF TORPEDO BOMBERS WAS LIMBERING UP WHEN ORDERS FLASHED THROUGH TO RETURN AT ONCE TO THE CARRIER."

"AS THE LAST PLANE SET ITS WHEELS DOWN ON DECK, THE EAGLE CHANGED COURSE."



"I SCRAMBLED OUT OF MY PLANE AND HURRIED TO THE ISLAND TO FIND OUT WHAT WAS DOING. BOB, MY KID BROTHER, MET ME ON THE WAY. HIS EYES WERE DANCING WITH EXCITEMENT AS HE TOLD ME WE WERE HEADING INTO ACTION. BOB WAS AN ENSIGN, FRESH OUT OF PENSACOLA. HE WAS A PILOT OF AN S.B.C. DIVE BOMBER AND A DARNED GOOD ONE."



ALL FLYING
OFFICERS TO ASSEMBLY



"WE DIDN'T FIND OUT WHAT WAS
GOING ON TILL ASSEMBLY"



"THE SKIPPER TOLD US AMERICA WAS
BEING INVADDED AND THAT ONLY
THE EAGLE STOOD IN THE ENEMY'S
PATH. HE CHARTED POSITIONS, TOLD
US WE WOULD ATTACK AT DAWN."

POSITION OF U.S. CARRIER WHEN
NEWS OF INVADER IS RECEIVED

560 Miles
680 Miles

DAKAR

WHERE INVADERS
WERE FIRST OBSERVED


WHERE INTERCEPTION
IS PLANNED

EQUATOR

"OUR ATTACK WOULD
BE SUPPORTED BY
BIG ARMY BOMBERS
IN A COMBINED AIR
ACTION."

NATAL

"OUR CHANCES WERE SLIM, THE
SKIPPER SAID. THE CONVOY WAS
HEAVILY PROTECTED."



ALL NIGHT LONG THE
EAGLE PLOWED AHEAD.

"WE WERE SUPPOSED TO BE SLEEPING, BUT I DON'T THINK MANY OF US DID. I LAY AWAKE WONDERING WHAT WOULD HAPPEN IF WE FAILED TO LOCATE THE INVASION CONVOY. ALL NIGHT LONG, FROM THE HANGAR DECK CAME MUFFLED SOUNDS OF PREPARATIONS AS PLANES WERE BEING ARMED AND READIED FOR THE TAKE-OFF."

"I WONDERED HOW STRONG THE ARMY SUPPORT WOULD BE - HOW MANY PLANES THEY WERE PREPARING AT THEIR BASES A THOUSAND MILES AWAY."

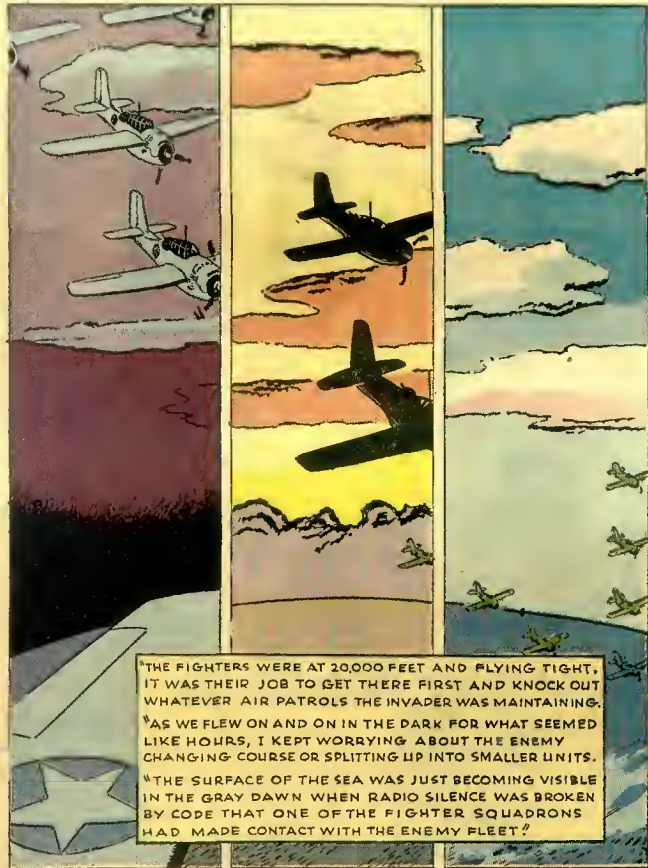
"OUR FIRST CALL CAME AT 0230. WE ATE A BIG BREAKFAST, THEN SPENT 30 MINUTES IN THE READY ROOM GOING OVER THE PLAN OF ACTION AND NAVIGATION DATA."



"SUDDENLY THE ORDER RANG OUT, 'PILOTS, MAN YOUR PLANES.' BOB RUSHED OVER WITH A BIG SMILE ON HIS FACE. HE SEEMED VERY YOUNG RIGHT THEN, AND FULL OF BOYISH ENTHUSIASM."



"THE FIGHTER SQUADRONS WERE FIRST TO LEAVE. NEXT FOLLOWED THE DIVE BOMBERS AND LAST OUR DIVISIONS OF HEAVY TBF'S, EACH WITH A 2000-POUND FISH HIDDEN IN ITS BELLY."



"THE FIGHTERS WERE AT 20,000 FEET AND FLYING TIGHT. IT WAS THEIR JOB TO GET THERE FIRST AND KNOCK OUT WHATEVER AIR PATROLS THE INVADER WAS MAINTAINING.

"AS WE FLEW ON AND ON IN THE DARK FOR WHAT SEEMED LIKE HOURS, I KEPT WORRYING ABOUT THE ENEMY CHANGING COURSE OR SPLITTING UP INTO SMALLER UNITS.

"THE SURFACE OF THE SEA WAS JUST BECOMING VISIBLE IN THE GRAY DAWN WHEN RADIO SILENCE WAS BROKEN BY CODE THAT ONE OF THE FIGHTER SQUADRONS HAD MADE CONTACT WITH THE ENEMY FLEET."

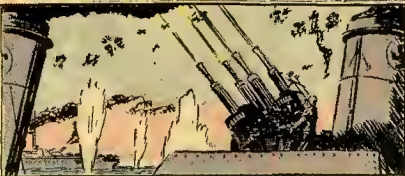


FAR BELOW US, ONE OF THE CARRIERS HAD JUST SENT UP A FLIGHT OF FIGHTERS. THEY WERE IN TIGHT FORMATION AT 5000 FEET, FROM ABOVE, OUR FIGHTERS SPOTTED THEM AND WERE RACING IN FOR THE KILL. BUT ONLY TWO OF THEM MADE THEIR DIVING ATTACK, FOR AT THAT VERY INSTANT THEY WERE THEMSELVES ATTACKED. FOUR OF OUR PLANES WERE SHOT DOWN WITHOUT KNOWING WHAT HIT THEM.



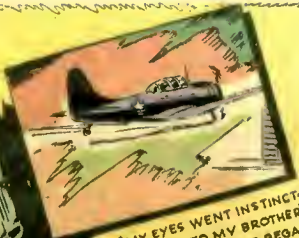
IF FOUR FIGHTERS DIDN'T WIN THEIR ROUND, THEY AT LEAST CREATED THE DIVERSION THAT OUR DIVE BOMBERS REQUIRED AND THE SBC'S WERE QUICK TO TAKE ADVANTAGE OF IT. THEY BEGAN TO PEEL OFF THEIR ECHELON AT ABOUT 7,000 FEET AND START THEIR DODGING RUN-INS THROUGH A WALL OF ANTI-AIRCRAFT FIRE.

FIRE FROM THE CONVOY'S ANTI-AIRCRAFT BATTERIES WAS VICIOUS. THE FIRST THREE SBC'S WERE BLASTED OUT OF THE AIR. THE FOURTH WRIGGLED THROUGH SOMEHOW AND MADE A PERFECT DIVING ASSAULT ON ONE OF THE CARRIERS.





"THE CARRIER HAD BEEN PREPARING TO SEND UP FIGHTER REINFORCEMENTS WHEN THE SALVO FROM THE SBC CAUGHT IT AMIDSHIPS. THE EXPLOSION WAS TERRIFIC. THE PLANES ON DECK WERE SMASHED AND HURLED INTO THE AIR."



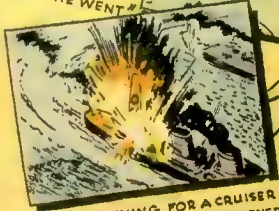
"MY EYES WENT INSTINCTIVELY TO MY BROTHER'S PLANE AS IT BEGAN ITS DIVING-DESCENT."



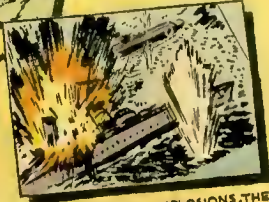
"HE KEPT TWISTING AND SQUIRMING LIKE AN END-RUNNER IN FOOT BALL. TWO OTHER BOMBERS NEAR HIM EXPLODED IN MID-AIR, BUT HE KEPT ON."



"SUDDENLY A SHELL BURST APPEARED TO ENGULF HIM - BUT ON HE WENT."



"BOB WAS DIVING FOR A CRUISER WHEN THE AWFUL THING HAPPENED. MAYBE HE WAS WOUNDED - MAYBE HIS PLANE WAS DAMAGED - BUT BOB NEVER PULLED OUT OF THAT DIVE. HE CRASHED ON THE DECK."



"THERE WERE TWO EXPLOSIONS. THE SECOND ONE SENT FLAMES UP HUNDREDS OF FEET INTO THE AIR AND FINISHED THAT CRUISER."

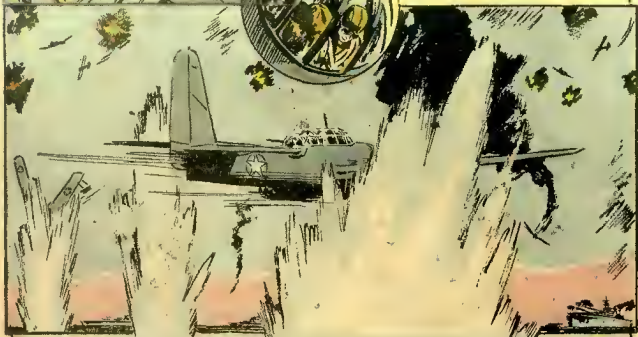
"HIGH OVERHEAD I THOUGHT I SAW
FLASHES OF SUNLIGHT ON THE
WINGS OF APPROACHING ARMY
BOMBERS—BUT MAYBE IT WAS
ONLY IMAGINATION. FAR BELOW, OUR
SMOKERS BEGAN TO LAY A SCREEN FOR
US. OUR TURN HAD COME.
WE DIVED AND WHEELED
TOWARD THE SMOKE SCREEN.
ENEMY FIGHTERS SWIRLED
DOWN ON US!"



"THE SMOKESCREEN WAS PROTECTING US FROM ANTI-AIRCRAFT FIRE BUT THE GERMAN FIGHTERS WERE MAKING SUICIDE ATTACKS TO KEEP US FROM LAUNCHING OUR TORPEDOES. THERE WERE 27 OF US IN THAT LINE, WITH 27 TONS OF HIGH EXPLOSIVES



"TWO GERMAN FIGHTERS WERE ON MY TAIL. MY GUNNER WAS BLASTING AT THEM ONE INSTANT AND THE NEXT HE WAS SLUMPED IN HIS SEAT, HIS GUNS SILENT. THE FIGHTERS WERE PLAYING HAVOC WITH US. HALF OF OUR TBF'S WERE IN THE WATER."



"ALL AROUND US HUGE CONES OF WATER WERE BEING EXPLODED INTO THE AIR BY LOW-ANGLE GUNFIRE. IF A PLANE TOUCHED ONE OF THOSE COLUMNS OF WATER, IT WOULD BE TORN TO PIECES. SOME OF OURS WERE. I SAW THEM."



"AS WE SHOT THROUGH THE SMOKE SCREEN I SAW THE CARRIER CHANGING COURSE. I VEERED WITH IT. EVERYTHING MOVED LIKE A SLOW-MOTION FILM. SECONDS SEEMED TO BE MINUTES. BUT I WAS COMING WITHIN RANGE—2,000 FEET, 1,500 FEET, 1,200 FEET—

"800 FEET, 600 FEET, A BARE 400 FEET FROM THE CARRIER. OUR TORPEDO SLIPPED INTO THE WATER, WITH A PRAYER. I BANKED AND CLIMBED RAPIDLY. I WAS SO CLOSE TO THE CARRIER DECK I COULD SEE EXPRESSIONS ON THE FACES OF MEN WHO SAW THE TORPEDO HEADED AT THEM."




"A PIECE OF SHRAPNEL PLOWED INTO MY INSTRUMENT PANEL AND ANOTHER WINGED ME IN THE SHOULDER. I CLIMBED AND ZIGZAGGED BACK TO THE SMOKE SCREEN. I SAW OTHER PLANES DROPPING THEIR TIN FISH. SHELLS WERE BURSTING ALL AROUND THEM."



"I WAS WELL AWAY FROM THE CARRIER AND HAD GAINED ALTITUDE BEFORE THE TORPEDO EXPLODED. IT WAS A BEAUTIFUL HIT, CRASHING INTO THE SIDE PLATES. ABOVE ME, ARMY BOMBERS HAD ARRIVED, AT LAST."





THE ARMY BOMBERS BLACKENED THE SKY. THEY DROPPED TONS OF BOMBS. TRIM, FAST, TWO-ENGINE B-26'S MADE ONE SUCCESSFUL TORPEDO ATTACK AFTER ANOTHER. THE CONVOY SCATTERED. IT BECAME DISORGANIZED. THE INVASION WAS FRUSTRATED. U.S. AIR FORCES HAD PROVED THEIR MASTERY OVER SEA APPROACHES TO AMERICA.

U. S. PLANE IDENTIFICATION

DETERMINING types and nationalities of aircraft is simplified when the observer becomes familiar with typical characteristics of airplane design. Large multi-motored planes are bombers, while smaller multi-motored planes can be either fighters, interceptors or light bombers. Stubby, low and mid-winged aircraft, whose motors generate shrill whines, are pursuists. Other types, between these

three basic classifications are observation, reconnaissance and scouting planes and dive and torpedo bombers.

First distinguish type of plane by size, number of motors and speed. Then notice which of the six basic wing designs the plane has. Each design is utilized by definite types of aircraft. Next step is to ascertain the position of wing in relation to body (Is the wing comparatively set ahead

or amid-ship and is the plane low, high or mid-winged?).

Tail assemblies are good identification tags. Double fins on a wide horizontal stabilizer signifies a bomber. Such designs prevent a rear "blind spot." Some interceptors and fighters have twin boom tail assemblies and twin rudders.

Also notice dihedral angles; whether they are inverted or gull wing shaped. Some of the large transports and bombers even have a dihedral angle in their tail assembly. All these variations are peculiar to particular craft.

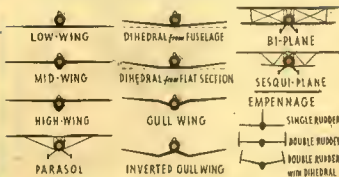
UNITED STATES ARMY WARPLANES



TYPES OF WINGS AND WING TIPS



WING ATTACHMENTS TO FUSELAGE



UNITED STATES NAVY WARPLANES



HOW TO

fly

AERODYNAMICS

A GOOD pilot knows not only how to fly but understands the laws of nature which make the flight of his airplane possible. The science of flight is called aerodynamics. The study of aerodynamics will tell you why one plane climbs faster than another, what gives the bomber its bomb capacity, how aircraft velocity is governed—and much, much more.

THERE is more to the subject of learning how to fly than a mere understanding of the basic controls and what they do, the essential dials and what they indicate, how to take-off, level-off, climb, bank, turn, glide and land.

If you are a pre-flight student of aviation or if you hope someday to wear the wings of the Navy or Army Air Corps, then follow these articles in every issue of Flying Cadet. They will not make you a pilot or teach you how to fly. But they will give you a sound and basic understanding of aviation and the fundamentals of aerodynamics, so that when you are being taught how to fly your lessons will be easier for you and you will be able to pass through them more rapidly.

Before we think about how to fly and the manipulations that control an airplane, we ought to find out what enables the airplane to fly.

Air is not just blank space or a

void. It is a substance called gas. Above us is an ocean of this substance just as in the sea there is an ocean of water. Like water in the ocean, air exerts a pressure on all objects with which it comes in contact. It is air pressure which enables the airplane to fly.

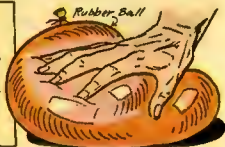
There are four forces which act upon an airplane in flight. The primary force is gravity. Gravity is constant. It operates at all times without relation to the forward motion of the plane. Unlike any of the other forces, its direction

is also constant, always being earthward.

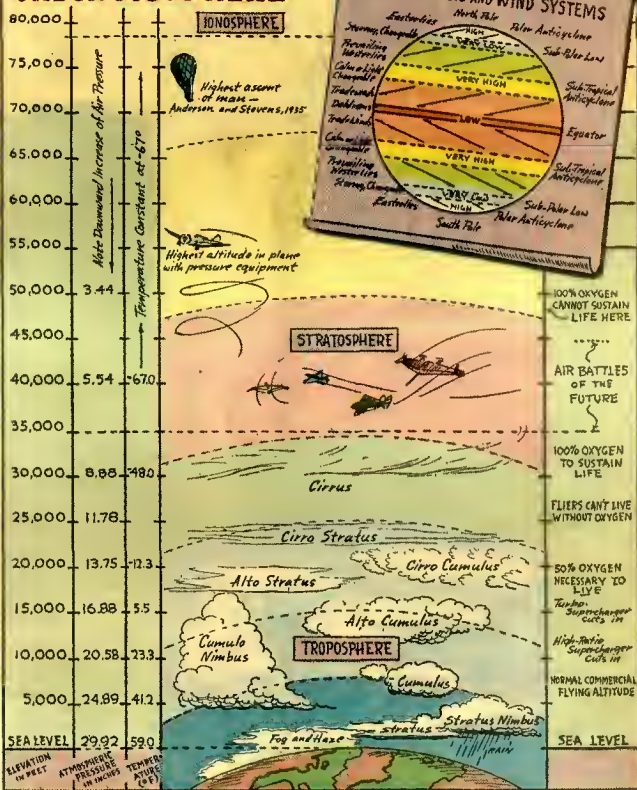
The second force is the forward drive of the plane accomplished by the engine-powered air screw. The air screw is the propeller. It is called an air screw because it accomplishes through the air what the wood screw accomplishes when it is turned into wood. The forward drive of the plane is called thrust. The amount of thrust, within limits, is regulated by the pilot from his controls within the plane. In relation to

WHAT IS AIR?

Air has the characteristics of a fluid, and can be made to flow or change its shape by the application of pressure and can be compressed to sustain weight.



CROSS SECTION OF THE ATMOSPHERE



CHARACTERISTICS OF AIR



AIR HAS WEIGHT

A cubic foot weighs about .08 lb.

AIR HAS PRESSURE

At any point the pressure is the same in all directions

Air occupies all space open to it. You can't half fill a glass with air as you might with water.



$$5\text{ grs.} \times 2000\text{ cc} = 10\text{ grs.} \times 1000\text{ cc} = 20\text{ grs.} \times 500\text{ cc}$$

DENSITY OF AIR
varies directly as pressure is increased, the temperature being constant.

$$PV = 2P \times \frac{1}{2}V = 4P \times \frac{1}{4}V$$

the plane, the direction of the thrust is always forward. In relation to the earth, the direction of the thrust may be whatever the pilot desires.

The third and fourth forces acting on a plane in flight are relative forces and are reactions of the plane to the air stream. They are called lift and drag.

Lift is the force which utilizes the air stream to make the plane rise at a right angle to its forward motion.

Drag is what its name implies. It is the resistance of the surfaces of the plane to motion of any kind. It exerts itself to stop such motion and exists in varying degrees as long as the plane remains in the air.

Because we cannot see or feel the air around us, we lose sight of the fact that it is a substance. It is composed of about four parts of nitrogen and one part of oxygen and several other gases. It has weight. A cubic foot of air weighs about .08 pounds.

Air is also highly fluid. It rushes in to fill all space behind an object as the object is moved from one place to another.

Air exerts pressure on everything with which it comes in contact. The pressure of the air is greatest at sea level and lessens as the air thins out with altitude. At sea level air pressure is about 14.7 pounds per square inch.

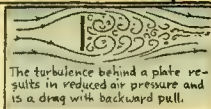
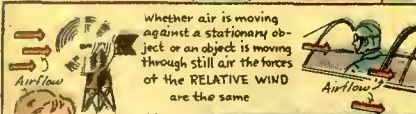
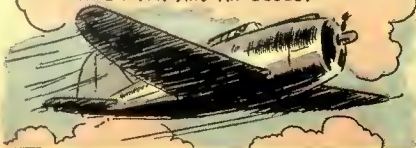
When we forget about air being something vague which we cannot see or feel and begin to think of it as a fluid substance like water, we are ready to comprehend the forces which lift a plane and shoot it through the air at 400 m.p.h.

The kite we used to fly in the air illustrates how air pressures and moving air can be used to sustain a weight heavier than air and thus defeat the force of gravity. By means of a string the kite is balanced at an angle in the wind and is therefore an airfoil based upon the same principles that give an airplane lift and make aviation possible.

Wind or air in motion is necessary to obtain lift. This wind is obtained by the drive of the propeller or the forward motion of the plane.

To induce the force of lift, air in motion can be developed either by wind driving against a stationary object or an object in motion travelling through still air. An example of wind in motion and a stationary object is the wind tunnel. In this tunnel, wind is

FLIGHT OR AERODYNAMICS IS THE STUDY OF FORCES PRODUCED BY RELATIVE MOTION BETWEEN AIR AND AN OBJECT



created by huge fans and model airplanes having no internal driving force are lifted off the ground and raised into the air by the difference in air pressure resulting from the wind streaming over the curved surfaces of the wings of the model.

The wings and control surfaces of the plane are called airfoils because they utilize this wind. The wings use it to obtain lift. The control surfaces use it for direction and stability.

The most important airfoil is the airplane wing. The wing has been designed so that air travels over the top surface at a different speed than over the bottom surface.

Air in motion exerts less pressure than still air. As the speed of its motion is increased, its pressure is decreased.

The airplane wing has been designed so that the distance over the top of the wing is greater than the distance around the bottom of the wing. As the leading edge of the wing slices through the air,

air which flows across the top and bottom of the wing arrives at the trailing edge at the same time. This requires the air at the top to travel faster than the air at the bottom. The air pressure at the top is therefore less than the air pressure at the bottom and the wing is forced upward.

As the speed of the wind is increased the lift of the plane is increased. When the speed of the plane is accelerated, it is drawn upward with greater force.

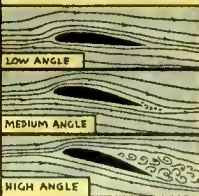
The angle at which the wing strikes the air is called the angle of attack. As the angle of attack is increased the lift is increased, up to the angle of stall. At the angle of stall there can be no greater reduction in the pressure above the wing.

The shape of the wing itself affects the amount of lift. As the curvature at the top of the wing is increased, the lift is increased.

Drag opposes the forces of thrust and lift. The next lesson in this series will be devoted to an explanation of drag.

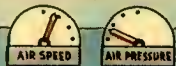


PRESSURES AND FLOW AT ANGLE OF ATTACK

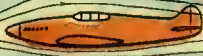


AIRFOIL SECTION

So designed that air flowing around it produces useful force.



Air in motion exerts less pressure than still air. The faster the air moves the less pressure it exerts.



Relative wind produces a force which holds the Airplane up.

CONTINUED —
In the Next Issue

The Sky's ... **No Limit!**

by L' MEINRAD MAYER

Co-Axial Propellers

TEAMWORK

THE BASEBALL NINE AND FOOTBALL ELEVEN,
THE BOMBER CREW AND ARMORED DIVISION,
— LIKE A PLANE IN FLIGHT!

YOUR FIVE SENSES AND CREATIVE MIND,
HAVE FEW LIMITATIONS YOU WILL FIND,
WHEN CO-ORDINATING LIKE FISH'S FINS —
YOUR EFFORTS SUCCEED, 'CAUSE TEAMWORK WINS!



*The Bomber Crew that aims as one,
To annihilate the Jap and Hun!*



THE NORDEN BOMBSIGHT

OPPOSING FORCES CANCEL
EACH OTHER OUT, NORMAL
EQUILIBRIUM IS UNDISTURBED

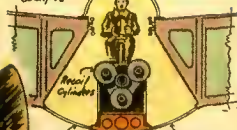


TORQUE REMAINS BUT IS
OF MINOR IMPORTANCE

Wing

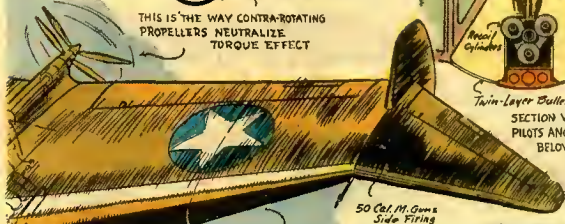
THIS IS THE WAY CONTRA-ROTATING
PROPELLERS NEUTRALIZE
TORQUE EFFECT

Pressure-Sealed
Cockpit



Twin-Layer Bulletproof Glass

SECTION VIEW SHOWING
PILOTS ANGLE OF VISION
BELOW THE PLANE

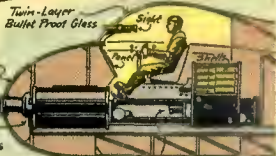


50 Cal. M. Guns
Side Firing

Twin-Layer
Bullet Proof Glass

Non-Rivet Skin
Flame Arrestor

Air-cooled Barrel
Recoil Cylinders



Loading Mechanism

SECTION VIEW SHOWING PILOT'S SEAT MOUNTED ON HIGH-VELOCITY CANNON

A TOUGH TEAM...this Pilot and Super-Fighter!

This "Victory-Wing" design, a future possibility, is based on one of the most successful of post-modern marvels. Changes from the original and these imaginary specifications are mine.

Fighting Ceiling—60,000 feet

Two Super-charged motors, 2500 H.P. Each

Speed 600 M.P.H., Range 3000 miles

Armament 50 M.M. High-Velocity cannon

Four 75 cal. and four 50 cal. machine guns

"THAT'S IT!"



THE *BATTLE* OF FORMATIONS



THE BASIC 'VEE'
THREE PLANE ELEMENT

BASIC flight formation, adaptable in offensive or defensive action, is the "vee." Three planes, comprising a flight, are shown attack bombing a troop column.

Big "vee" in lower left hand corner is variation and is used by all types of craft because of its flexibility. Each plane protects one in front and all can see flight leader.

Division "diamond" formation



THE BIG VEE



THE DIVISION DIAMOND

affords good protection and flexibility but last plane has maximum danger. This type formation is seldom used today in military action.

Dogfighting between aces belongs to a past age. The hard and fast rule today is "never get separated from your squadron". A single plane is almost sure of being downed, if not by enemy planes then by anti-aircraft fire. In formation planes protect each other, one hits, the other fends. Teamwork is aviation's byword.

Staggered-line formation, immediately below to the left, is the three-plane element used for strafing ground troops and attacking bombers. While two planes attack the third protects the rear.

Another example of the "vee" application is the right echelon

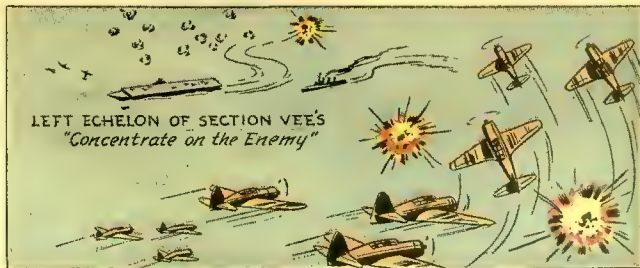
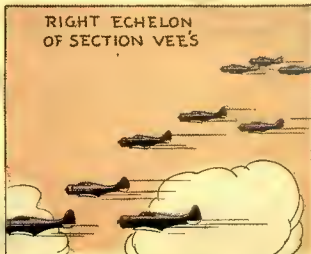
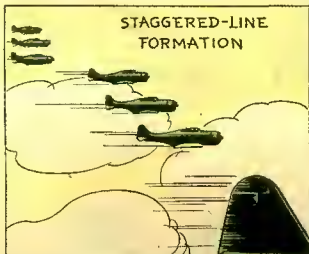
of section "vees" in the right, below. The three plane element for attack can also be developed easily from this formation. Echelon on section "vees" is very elastic formation because flight can turn suddenly and planes in threes can attack target simultaneously from different angles.

Bottom illustration shows actual attack of a left echelon of "vee" formation torpedo planes on a carrier. The theory is to attack from all angles, avoiding concentrated anti-aircraft fire and preventing carrier from evading torpedoes by sharp turns. When many planes attack in this fashion some hits are sure to be scored. Even though planes expose themselves to deadly fire, it must be remembered that it takes only one torpedo in the right spot to sink a capital ship.

The ideal situation is to catch a capital ship between two echelons of "vee" formation torpedo planes. No matter which way the ship turns it will be broadside to one of the echelons. It was just such tactics that the Japs used to sink the Prince of Wales and the Repulse.

Another effective variation of the three-plane element attack is the two-plane element attack. Again this is an example of teamwork. Element after element attack objective, usually an enemy bomber, with the second plane protecting the rear of the first plane. It might be called the "one two" punch.

The formation that planes will assume depends upon their task. Even so, from minute to minute the situation might call for a new formation.





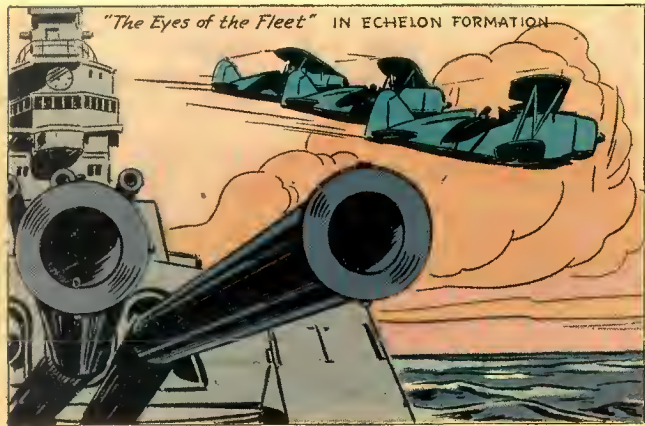
"After the Attack"
RE-ASSEMBLING IN.
STRING FORMATION

STRINGS FOR STRAFING

ACTUAL flight formations used by our Air Forces are strictly confidential. But all formations are combinations of planes or variations of simpler formations which will afford the best defense, the greatest offensive power or combinations of both. Formations must be flexible and not easily disorganized. Fire power must be easily concentrated.

Reassembling after an attack also requires formation. Usually planes come together in string formation and gain altitude until they develop a new formation. String formation is dangerous because enemy gunners can pick off planes one at a time. However, when heavy anti-aircraft fire is absent and there is no fighter opposition, string formations are used for strafing.

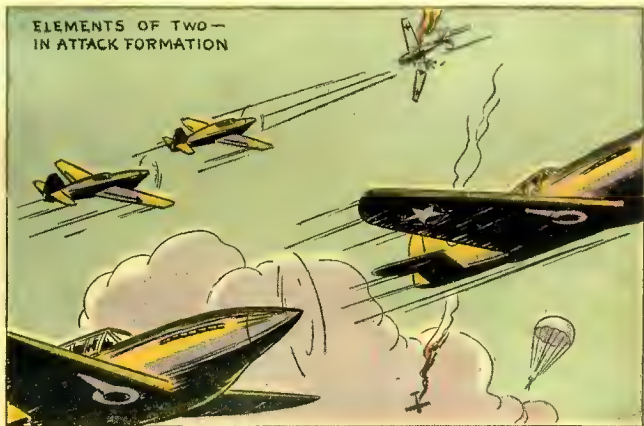
As effective and flexible as the "vee" is the echelon. Flying one slightly to the side and higher, either to the left or right, the planes in echelon can break into any other type of formation. The echelon formation often is used in attack and patrol work.



"The Eyes of the Fleet" IN ECHELON FORMATION



THE VEE OF VEE'S —
FOR PATTERN BOMBING



ELEMENTS OF TWO —
IN ATTACK FORMATION

FORMATIONS IN BATTLE

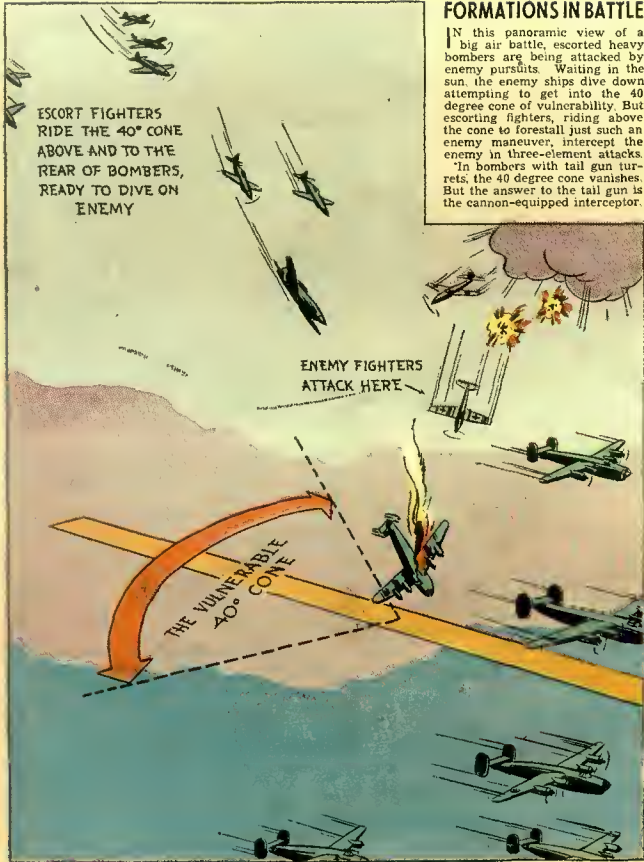
ESCORT FIGHTERS
RIDE THE 40° CONE
ABOVE AND TO THE
REAR OF BOMBERS,
READY TO DIVE ON
ENEMY

IN this panoramic view of a big air battle, escorted heavy bombers are being attacked by enemy pursuits. Waiting in the sun, the enemy ships dive down attempting to get into the 40 degree cone of vulnerability. But escorting fighters, riding above and to the rear of bombers, intercept the enemy in three-element attacks.

In bombers with tail gun turrets, the 40 degree cone vanishes. But the answer to the tail gun is the cannon-equipped interceptor.

ENEMY FIGHTERS
ATTACK HERE

THE VULNERABLE
40° CONE





ENEMY FIGHTERS
WAIT IN THE SUN

INTERCEPTORS ON THE FLANK

BOMBER SQUADRONS
KEEP IN FORMATION

DIRECTION OF FLIGHT



A B C of NAVIGATION

CLAMOUR and glory, two of aviation's constant companions since its birth in the sands of Kitty Hawk, died when the last bugle sounded "taps" in World War I. The boys who piloted the frail Spads and Neuports of those days, flew by the seat of their pants—and many never returned.

Today, when Flying Fortresses wing out from the British Isles into pitch-black night, over hundreds of miles of hostile territory to drop their bombs on vital pinpoint targets, there is little guesswork. They know where they want to go and they get there. That responsibility belongs to the navigator and makes him one of the most important members of the flying team comprising the bomber crew.

Navigation is the means of determining where you are and the course that will take you from there to where you want to go.

Today, three methods of navigation are used in flying. The

first is with charts or maps and visible landmarks or beacons. The second is with the radio signal and is called radio navigation. The third is with celestial observations. Instruments are an important part of navigation and will be dealt with later in this series of articles.



Charts or maps are the foundation of all navigation. We must start with a thorough understanding of what the map is. In the first place, all maps are inaccurate for, on a flat surface, the map attempts to picture a world which is not flat. Prove this to yourself someday by taking the cup-like empty peeling of half an orange. Attempt to flatten it and you will find that it will tear open in one or two places. In our preliminary studies we must think of the world as a sphere and make allowances for the inaccuracies of maps.

In order to locate positions on our sphere, we must divide the world into segments. By using the North pole as a starting point, we are able to enclose the entire world in a graph. By reference to the lines of the graph, we will be able to locate any position anywhere.

Half way between the North

and South poles we circle the earth with the first line of our graph. This line we call the equator.

From the North pole to the South pole and parallel to the equator we can now circle the earth with other lines until pole to pole, it is divided by parallel lines. These parallel lines around the earth, we call degrees of latitude.

The line we have drawn around the center of the world, the equator, is the largest of our parallel lines and is the only one we have made which gives us the complete circumference of the earth. As they go farther and farther away from the equator, our parallel circles of latitude grow smaller and smaller.

The circumference of the earth, or the distance around our globe

- at the equator, is approximately 2600 miles.

Any circle around the world which divides the globe into two equal parts would, therefore, be 2600 miles in circumference. Circles of this kind are called great circles.

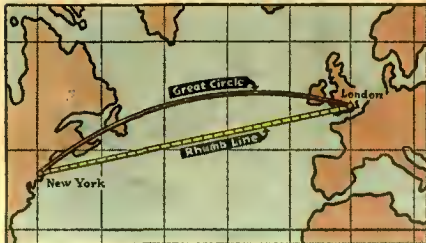
In order to complete our graph of the earth, we must have more reference lines, so we draw one from the North pole to the South pole. This line we call a meridian. In order to anchor our first meridian to a point of reference, we imagine that it passes through Greenwich, England. Now, with Greenwich as a starting point, we can draw more equally-spaced lines from the North pole to the South pole so that they divide the earth into twenty-four equal parts. As each of these pole-to-pole circles around the earth divides the globe into two equal parts, it is a great circle. All meridians are great circles. The equator is the only parallel of latitude which is a great circle.

Each of our parallels of latitude consist of 360 degrees. By dividing the 360 degrees into twenty-four equal parts, each meridian therefore defines a 15° position of longitude. With Greenwich as a starting point we can identify positions of longitude, anywhere on the earth. For greater accuracy, we divide each degree into sixty minutes and each minute into sixty seconds.

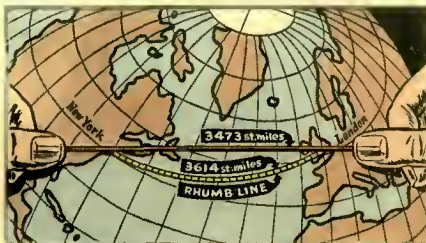
By starting with the equator as zero we identify positions of latitude in the same manner, there being a quarter of a circle or 90° from the equator to either pole.

Positions on the earth are, therefore, defined as being so many degrees, so many minutes and so many seconds, North or South of the equator, and so many degrees, so many minutes and so many seconds East or West of Greenwich.

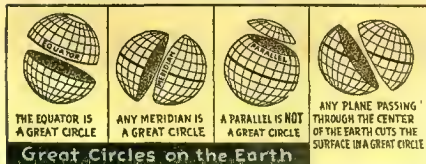
There are a number of ways of picturing the global world on a flat map. The one most used in navigation is called the Mercator projection, which is illustrated on this page. On this map the rhumb line appears to be the shortest distance from New York to London. By reference to a globe, the deception of the Mercator map becomes obvious. The shortest distance between any two points on the earth, if continued as a line around the earth, would be a great circle and would divide the globe into two equal parts.



Great Circle versus Rhumb Line on the Mercator Projection



Great Circle versus Rhumb Line on a Sphere



Great Circles on the Earth



WITH the second year of the Army's and Navy's expanded training program drawing to a close the demand for flying officers and crew members is greater than ever. Scores of training centers throughout the nation are pouring out a flood of highly skilled pilots and other essential flying personnel. Coveted flying wings are being given to all members of the flying crews of American warplanes—to the pilot, co-pilot, navigator, bombardier, gunner and observer. Essentially, all the badges are wings, each differing from the others only in some small symbol which designates what service the wearer performs. On this and on the opposite page is a complete grouping of the badges given by the Army and the Navy.

Once the preliminary hurdles have been passed an Army Air Cadet enters a 36-week training course. During training his pay is \$75 a month, plus \$1 a day subsistence allowance, free quarters, medical care, hospitalization, clothing and food.

Upon graduation the flying cadet is commissioned a 2nd Lieutenant and is assigned to that branch of the air force in which he has displayed greatest ability during his training period.

Flying 2nd Lieutenants receive up to \$291 a month (higher for men with dependents). They also receive extra allowances and bonuses.

Qualifications for Navy Flying Cadets are similar to the Army requirements. Flying cadets must be unmarried, citizens of the United States for 10 years and between 18 and 27 years of age.





SERVICE PILOT



GLIDER PILOT



LIAISON PILOT



COMBAT OBSERVER



BOMBARDIER



NAVIGATOR



AIR CREW MEMBER



FLIGHT SURGEON



SENIOR BALLOON PILOT



BALLOON PILOT



BALLOON OBSERVER



TECHNICAL OBSERVER

NAVY WINGS

AVIATION SPECIALTY MARKS



PILOT



MACHINIST



AEROGRAPHER



ORDNANCEMAN



OBSERVER



METALSMITH



CARPENTER



GENERAL UTILITY

Sometimes, Pilots Think Strange Things About Their Planes. Bobby Greer Thought His Was a Witch—Until She Saved His Life



Spitfire

GLORY

By ROY YONGE

Illustrated by Wesley Neff

PILOT OFFICER ROBERT GREER had a grudge against her. Sometimes, so bitter was his feud with her, he was tempted to wash her out, except that that would have meant confessing she had licked him. And Greer was stubborn.

You'll be thinking he was a little crazy, too. A pilot with a grudge against his plane? A pilot with a grudge against a Spitfire? It sounds nuts, all right. What's a Spitfire, after all? It's a machine, a flying machine—a very beautiful machine, with its long elegant nose and tapered body and sleek wings, but still only a machine. You can't have a grudge against a machine. It's not alive.

That's where you'd be wrong. Because every fighter plane is alive, in a way. Every one of them is different, even if they're the same mark, designed and built by the same people to exactly the same specifications. Every one of them has characteristics and moods of its own. They're more than just machines. Somehow, they're alive.

Any good fighter pilot will tell you that. Take Cobber Kane, for instance, the first RAF ace of this war; this is the way he'd speak of his own pet Hurricane: "The old girl's feeling good this morning," he'd say, patting her flank. "She's in a good mood. You watch us knock 'em down today." He wouldn't fly any other ship; he didn't want to make his own

sweetheart jealous. Well, that's the way he talked.

So Cobber Kane was in love with his ship, and so are a lot of other fighter pilots, American and British and Russian and Chinese—but with Bobby Greer, Pilot Officer Greer, it was different. He hated his.

Greer was a big blue-eyed fellow, with muscle enough to lift himself by his own bootstraps and a mop of hair so blond it seemed white. To look at him, you'd think he was a placid, easy-going, unimaginative guy without a worry in the world.

There are lots of Texans like that and Bobby Greer was a Texan. Twenty-one years old, he had come over to England in 1940 to try to make the RAF, first because flying was in his blood, and second because he wanted to get out of America. Greer was bitter and angry inside. The girl he had gone with in high school and college had jilted him, thrown him over for the fellow he'd thought was his best friend. People like Greer don't get angry in a hurry, but when they do it sticks in their throat, they can't get over it, they build it up out of all proportion to its true weight—a smoldering bitter fire of anger. Greer didn't take it out just against the girl, he took it out against everything, his home town, his home state. It had all gone sour in his mouth. He never wanted to see home again.

Greer got the action he wanted. He earned his RAF wings just as the Nazis started to try to bomb London from the face of the earth. He didn't have any time for thinking, just fighting, eating, sleeping, fighting again. He flew a Hurricane in those long burning days when the smoke clouds lay heavy over blistered London and the Channel skies shuddered with the roar of Goering's armadas. His ship was shot from under him and he spent five months in hospital recovering from the lead he'd absorbed. It was a miracle he wasn't killed; he had taken enough chances for a dozen men.

But Greer got over it and came out of hospital good as new and was assigned to a new Spitfire squadron. This was where he met Glory.

He didn't call her Glory at once. He called her that only after he'd come to know her. Glory was the name of the girl in Texas who had thrown Greer for a loop.

He called his Spitfire Glory because he hated her, and because he was convinced she hated him.

She had a wicked, vicious life of her own. It sounds crazy, but Bobby Greer believed it with all his heart. Just as the girl in Texas had done, she tried to show him up as a sap, make a fool of him, a hamfist, a guy who never should have taken a plane off the ground.



He called her Glory because she reminded him of the temperamental, headstrong girl back in Texas who had jilted him.

She did this first one of the days when the new squadron was shaking down together, learning to work together. They were doing some nice tight formation flying, steady and firm in the sky, the precision flying of a crack Spitfire outfit. And suddenly Greer's Spit wobbled, fell off, and he was a couple of miles out of line before he knew it.

He hadn't touched a thing. He would have sworn to it that the plane had just taken the bit in her own teeth, like a horse.

"What in blazes went wrong with you up there, Greer?" the Squadron Leader asked him later. "Doze off for a little nap?"

Red-faced and furious, Greer mumbled some sort of apology about getting used to a new ship. The Squadron Leader saw how hard he was taking it and slapped his shoulder. "Forget it, old chap," he said.

Greer didn't forget it.

Spitfire Glory wouldn't let him. Things like that went on happening—like catching his foot somewhere climbing out of the cockpit and falling flat on his face, knocking out a tooth so that for the next few days everyone was asking who'd beaten him up. Like having the Spit's Merlin conk out on him during a night flight and only roar into life again at the last second. Things like that don't happen with Merlins, don't happen with Spitfires—unless your plane has it in for you.

This plane had it in for him. But it couldn't lick him; Greer vowed that. He could have asked for, and got, another ship. He could have if he'd made enough of a point of it. He was darned if he would. The girl in Texas had made a sap of him; this Glory wouldn't. He was going to lick her.

He took her up one day after being almost brained by a kick-back of her prop and beat her all over the sky, handling her with all his strength, wrenching her out of a dive, batting her around on a wing tip, skidding and sliding and pouring on the power until she seemed to scream in agony.

And then when he took her down and set her on the field with a deliberate crashing thud and climbed out of her, sweat on his brow but with some sort of bitter satisfaction in his heart—then his foot caught and he fell on his back and slammed every ounce of breath from his lungs.

Gasping, choked with rage, he got to his feet. He swung back one leg and let it go with all his force. He kicked her. Then blindly he strode off while the ground crew stared at him in open-mouthed astonishment.

It was incredible that he came out of the chances he took in those days. On the squadron's sweeps over France he sought out the hottest nests of ground fire, raking them with his cannon; he went looking for hopeless odds; he batted his plane through hair-tangling, impossible situations.

Perhaps he wasn't altogether

sane in those days. He was fighting a Spitfire, to beat her or be beaten, and it kept his bitterness and anger alive. He was living only for one thing—the showdown that must come, the last fight.

So, of course, the showdown came.

It was a few weeks after Pearl Harbor. "Well, you're in it with us now, old chap," his Squadron Leader had said. "In it all the way. I daresay you'll be wanting to get back to your own country, or transfer to your own Air Force. I think it can be arranged."

Greer said nothing.

"I imagine they'll find you jolly useful," the other went on, "with the combat experience you've had. You've done your share of fighting. They'll be needing all the chaps like you they can get, to train their own boys. We'll hate to lose you, but—"

"I'll be staying here." Greer said shortly.

The other gave him a curious look. "I see. Well, it's up to you."

Greer thought of that later. They were out on one of their regular Channel sweeps, fairly high, roaring up-Channel through clear cold sunlight, blinding blue above, deep white-flecked blue below, France to the right and the cliffs of England behind and to port. And beyond England, Greer was thinking, was the Atlantic, and beyond the Atlantic, far beyond—there was America. A place he was never going to see again. Why should he?

What did it mean to him—home? What had happened to him there but getting kicked around?—the kicking around that had started all this, had changed him from a big easy-going kid who took the whole world for a friend into the tight-faced brooding bitter man he was now—a man everyone was down on, or so he thought, even this Spitfire Glory—witch that would have flung him into the Channel if he eased up on her for a moment. He could feel her trembling, as if straining to throw him out.

Then the Messerschmitts came down like an avalanche out of the sun and Greer didn't have any more time for thinking.

They struck in a roar and flash, a mob of them, pouncing from superior altitude on outnumbered Spitfires they'd caught off guard. That first flaming swoop sent two Spits staggering. In an-



Gasping, choked with rage, he swung back one leg and let it go at the plane with all his force.

other few seconds they had a third. Then they began to trade their punches. For Greer had hauled Glory around—and even if he was perhaps a little off-balance in his mind, Greer was an A number one hot-flash fighter pilot. He got one of the Nazis flush in his sights and gave it the button and saw his shells rip its spine. Then two more were on him and a line of lead punched his left wing. He wrenched Glory head-up, flopped her over and came down in a blasting dive at a swastika he'd spotted below. He saw its tail assemblage ravel away like yarn in a pulled sweater.

Then there was a blow on his shoulder, a sledgehammer out of the air, and he went black.

What happened immediately after that he never knew. Perhaps his Spitfire Glory, feeling his grip gone, had plunged down hell for leather for death in the Channel, and he, revived by the howling rush of air through the shattered shield, had come to and yanked her out of it into horizontal flight. He didn't exactly know. He only knew he was punch-drunk with the burning pain of his shoulder and fighting desperately to hold Glory even. There was no one else in sight. The speed of the fight had carried them miles away.

He was dizzy. He was wrestling that jolting, bucking plane. Most of his strength was gone; he couldn't fight her on even terms.

If he stuck with her, she'd kill him. He couldn't hold her much longer. She'd kill herself and him too.

Well, wasn't that all right? Why not beat her to it? Wasn't that what he'd been waiting for? Why not put her nose down and jam her into the Channel? Not let her do it to him, but do it to her—lick her—beat her, once and for all!

But even as he moved to thrust the stick forward, he knew he didn't want to die. He wanted to beat Glory, yes—but he wanted to stay alive.

He was thinking of that country he'd never wanted to see again, of his Texas home town, of all the kids he'd known there, the kids growing up now. They'd be flying soon. They'd be coming up against stuff like this—like this fight over the Channel. They'd be wanting people to tell them about it, fighter pilots who'd been through it.

And because a girl had thrown him over and a plane had got his goat, he was going to let them down!

And Greer saw himself suddenly and clearly as he had been, self-centered, nursing his childish little grievance until it had driven him almost nuts, and he hated the sight of himself.

He was going to live.

Waves of weakness were washing through him. It was perhaps because of his condition that he thought he could hear the Glory-witch speaking to him. Saying something in the beat of her Merlin—screaming it at him in blind rage—"Get out of here, get out of here, get out of here!"

Trying to get rid of him! Well, he could laugh at it now. He was going to live. He would get out. He couldn't hold her straight

much longer, anyhow. And down there on the Channel was the white wake of a ship—a launch, it looked like—an RAF rescue launch.

He wrenched at the hatch with his good hand, pulled it back. "Go ahead!" he shouted in the wind. "You think you've won—you think and you're rid of me!"

A final great lurch from Spitfire Glory seemed to throw him out. The next instant his chute had flowered and he was swaying there alone in midair, and Spitfire Glory was a fading dot.

Flying herself. Yes, flying herself! Flying even and smooth, rid of him at last, as if she were laughing at him.

And as he stared at her there was a great blinding burst of orange flame and smoke, and she shattered into fragments in that last flight. . . .

The people on the RAF rescue launch thought Greer was delirious from his wound, the way he was jabbering to himself. "She wanted to get me out," he was saying. "She wanted to. She knew she was on fire; I didn't. She knew she was going to blow any minute. She knew what I was thinking about those kids at home. She knew I wasn't nuts any more. She only hated me when I was nuts. When I got my sense back, she wanted me to live—"

Crazy?

Well, every fighter plane has a life of her own, characteristics of her own, moods of her own, just like a living thing. Ask any fighter pilot. Ask Bobby Greer, U. S. Army Air Force, somewhere in England. He'll tell about it.



PLANES AT SEA

THE desperate need for air bases near the scene of battle—at sea as well as on land—is once again making dire necessity the mother of invention. In the scramble to achieve superior aerial striking power, military experts and scientists of the warring nations are ceaselessly developing new tactics and secret weapons. What are some of these new weapons and tactics?

Japan's contribution to secret weapons is one which comes as a fantastic story from Chinese intelligence agents which, if true, might change Allied strategy in the Pacific. These agents report that the Japs have perfected large bamboo fields, made up of smaller bamboo mats joined together, to act as sea-airports for their bombing and scouting planes.

When one remembers the exceptional buoyancy and strength of bamboo, the application of bamboo sea-airports to modern war tactics might be entirely within the realm of reason. Floating bamboo fields, replacing expensive aircraft carriers, could serve as highly mobile offensive and defensive weapons.

As an offensive weapon, bamboo air bases could be used thus:

Under the protecting mantle of night a group of Jap fishing boats approach our West coast. Silently they drop small bamboo sections into the water and tie them together, forming a huge field. Meanwhile a fleet of heavy Jap bombers is winging its way towards the factory areas of our West Coast. American defense authorities do not expect a raid

because they know that the total round-trip distance between the nearest Jap base and the coast is far greater than the maximum range of Japan's best bomber. Suddenly in flights of 3, 6, and 9 planes, the Japs appear on the horizon. They dart to their objective, drop their bombs, and wing out to sea again. Their gas tanks are almost empty. But instead of a watery grave, one at

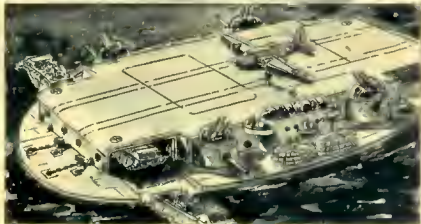




a time, they land on the bamboo field, refuel, and fly back to their base. Absurd? Nothing is absurd or impossible in this war.

As a defensive weapon bamboo airports could be constructed in the hidden bays of the mountainous Pacific islands. On such islands it is almost impossible to cut through the dense jungle or find a level patch of land to construct an airport. From these make-shift bamboo fields scouting planes could operate, with their bases remaining hidden behind tall trees and hills. If discovered, however, the landing rafts are probably easily assembled and disassembled, and they might be moved before concentrated action could be brought about to eradicate them.

Actually the sea-airport idea is old. It was first discussed seri-



INVASION BARGE envisioned by Admiral Pratt in an article in the magazine "Newsweek" is in reality a cross between an aircraft carrier and an unsinkable seadrome. Used in quantity to support troops assigned to establishment of a beachhead, its value would be chiefly in moving close to the area of operations facilities for re-arming and re-fueling. If two-engine planes were to be accommodated on the barge, the landing run would have to be much larger than the one shown in above sketch.

ously in 1929 when our government considered the loan of \$30,000,000 to the Ocean Seadrome Dock Corporation for the construction of huge steel seadromes to be strung across the ocean.

Seadromes are large T- or X-shaped platforms, stabilized and supported by huge hollow cylinders sunk 100 feet below the ocean's surface—the depth of greatest calm. Between two decks are hangars, living quarters, storage rooms and a radio station. The top deck serves as plane

SIMPLIFIED SEADROME. As planned many years ago, seadromes would be elaborate floating hotels with outdoor sports such as tennis and miniature golf. Today, an unsinkable seadrome might be used as a military plane base.



runways and is clear except for observation towers, radio aerials and, if need be, anti-aircraft gun emplacements.

Two or three of such seadromes strategically located in the Atlantic might prove invaluable. Bristling with anti-aircraft guns and loaded with speedy fighting planes such stepping stones in the ocean would be defendable and comparatively secure. They could serve as bases for the more efficient land based patrol and

bombing planes which could clear the convoy lanes of U-boats. Then they could also serve as refueling bases for the flight-delivery of short range pursuit planes to remote points. And, if built for the purpose, they could be towed along with an invasion fleet and serve as aircraft invasion bases.

Major de Seversky, in his book, "Victory Through Air Power," claims that such sea-airports would be impractical because modern planes have such long

ranges. But even the Major must admit that it might be far more practical not to sacrifice bomb load capacity for range when it is possible to bring bombing planes closer to their targets.

But already there has been talk of an invasion-type barge which would be similar to an aircraft carrier. Described by Admiral William V. Pratt, in the August 31st issue of "Newsweek," as a cross between the Monitor and Merrimac of Civil War days, the

barge would have such a shallow draft that enemy torpedoes would pass harmlessly beneath its keel. The flat top deck would be a flight deck for fighter aircraft. Speed would be no object since this type of barge would only be used in the company of other heavy fleet units. Designed chiefly for shallow water, the barge could crawl up a beach, launch its planes, and fight off land opposition with its own double purpose guns.

Another theory of bringing aircraft to an enemy's shores is that of employing plane carrying submarines. The British had one in their "M-2" and the French also in the huge "Surcouf."

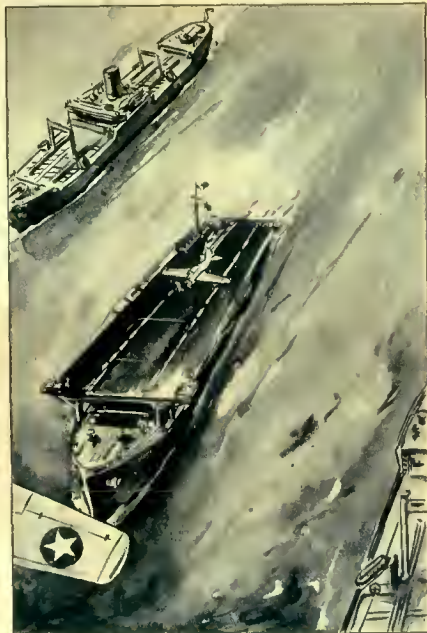
Both were exceptionally large submarines which were equipped with a hanger for a small, wing-folding seaplane. It would be entirely possible for a fleet of such submarines to launch dive bombers at enemy industrial centers. The surprise would be complete. When relieved of their bombs the dive bombers would return to their mother submarines. The entire under-sea fleet could then submerge until the next night, and give a repeat performance.

A mysterious seaplane, which was seen flying over an Oregon forest recently, after flying in from the sea only to return after a half an hour, is suspected by Army officials to be just such a submarine based airplane, as Japanese bomb was identified.

Still another idea, and one which is being used by our side right now, is that of converting merchant vessels into small aircraft carriers, capable of launching 20 to 30 airplanes. Since submarines are extremely vulnerable to airplanes, it takes just a few planes to patrol and clear a convoy lane of U-boats. In convoy duty the use of large aircraft carriers is entirely impractical because of their tremendous expense, the length of time that is required for building them, and the risk of their loss in enemy action. Such considerations do not hamper the conversion of merchant ships because merchant ships are easily converted and comparatively inexpensive. Further opportunities in arming the merchant-ship convoy for its self-protection are presented by developments of the helicopter and autogyro which do not require large areas for take-off or landing.



CONVERSION of vessels to carry aircraft is well under way in the United States. Before conversion, "Seeandbee," shown above, was a Great Lakes pleasure boat. Now, as the carrier "Wolverine," it trains pilots.



FOUR MONTHS is all the time that is required to change a 12,000 ton vessel into a baby carrier, capable of berthing a small number of planes.

CADET QUIZ

FROM WHICH DIRECTION
DOES A WEST WIND
COME?



①

"WHAT DO I
DO NOW?"



④

IS "THE DOPE" A STUPID PILOT ☐
OR A CELLULOSE-NITRATE PAINT ☐



⑤

IN TAKING OFF, WHICH IS BEST
☐ HEADING INTO THE WIND
☐ MOVING WITH THE WIND



②

WHAT IS THIS?

- ☐ PARASOL-WING PLANE
☐ AUTOGYRO OR
☐ HELICOPTER?



③

CUMULUS IS ICE
FORMING ON THE
WINGS
☐ RIGHT ☐ WRONG?

How much do you know about aviation? Test yourself with the questions on these pages. A score of 60% is fair, 70% is passing, 80% is good—and if you score 90% you're just about perfect. Answers are printed on the next page.



⑥

WHAT IS THIS?

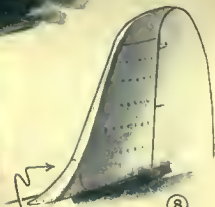
- ☐ THE WAFFLE ☐ GRID
☒ FLAPS ☐ ALERONS?



⑦

WHAT IS THIS?

- ☐ FERRIS WHEEL
☒ BELLY BUBBLE OR
☐ PULL OUT ?



⑧

WHAT IS THIS?

- ☐ FEATHER ☐ WIND VANE
☐ FIN ☐ STABILIZER
☐ DRAG



⑨

- HIS MIGHT BE ☐ GROUND LOOP
☐ TETHER RING OR ☐ DIREC-
 ONAL RADIO ANTENNA

RIGHT OR WRONG

- The new German Focke-Wulf 190 is powered by an air-cooled engine.
☐ Right ☒ Wrong
- Kitty Hawk is the famous American aviatrix who has twice won the coveted Hendix Trophy.
☐ Right ☒ Wrong
- The Mitsubishi 00, called the Zero, has a fuselage and wings made of plastic-impregnated plywood.
☒ Right ☐ Wrong
- The Army has equipped the B-26 Army Bomber as a torpedo plane and has already demonstrated its striking power.
☐ Right ☒ Wrong
- The Army's new crack P-47 fighter can fly 400 miles per hour but is confined to altitudes under 20,000 feet.
☐ Right ☒ Wrong
- The air scoop is an air-intake for cooling airplane engines.
☒ Right ☐ Wrong

FLYING CADET, U. S. N.

(Continued from Page 13)
warrant Uncle Sam in spending \$10,000 more on your education, you will be sent for five months to an advanced flying school in Pensacola, Florida; Jacksonville, Florida; Corpus Christi, Texas; or Miami, Florida.

At the advanced schools you will first have to digest eight more weeks of ground school and 14 weeks of intermediate flying. Day after day you will sail aloft in yellow-painted advanced trainers called "yellow perils". You will practice taking off and landing in unbelievably small fields. You will practice scouting and search, and both free and fixed gunnery.

Then you'll begin flying better ships, 500 to 1,000 hp. training planes. You'll practice 3, 6, and 9-plane formation and division tactics; learning to join formations, peel off, and to land singly or in formation. You will become an accomplished combat pilot as the result of many hours of mock dog fighting and shooting at moving targets. Then there will be bombing from high altitudes, torpedo bombing and dive bombing.

At last, you can hand in your application for that branch of the service you would like to join. If it is agreeable with your commanding officers you will specialize either in flying those giant "watch dogs of the ocean," the Consolidated flying boats, or whipping sleek fighters through the sky at 400 mph., or handling observation planes. All are essential to the fleet and demand special qualifications.

When you have completed this exacting and rigorous routine, when your instructors have tested you and are satisfied that you know flying inside out, you'll be graduated from your "Annapolis of the Air" and get your commission and wings. You become a full-fledged aviator, an ensign in the U. S. Navy.

But before you can taste that much-longed-for action, there still is one more step in your training. You will be transferred to one of the many operational training schools throughout the country. The final rough edges will be polished off and you'll finally be classed an expert pilot in whatever flying division you have chosen. Your salary will be \$205 to \$245 a month.

Then you join the fleet. Where? Hitler and Hirohito would like to know too. You will fight for the United States as one of your country's finest and fittest. You will tackle with ease any job the Navy might assign you because you will have completed the best training in the world.

THE AIRBORNE COMMAND

Applicants for the "toughest" unit of the Army, the Airborne Command for paratroopers, are being accepted by the Army from officers of the Cavalry, Field Artillery and Infantry.

Because a paratrooper may run into any conceivable situation with treacherous foes, he needs a razor keen mind, plenty of stamina and resourcefulness. The training will probably be the most grueling in Army history, covering every type of offensive and defensive tactics, both hand to hand and armed assault, and vigorous conditioning routines.

Applicants must not be over 6 feet tall; not over 185 lbs; have distant vision, uncorrected, not less than 20-40 vision; and be in excellent physical condition. No Majors over 40 or Captains or Lieutenants over 32 will be accepted. Enlisted men must be between 18 and 32.

QUIZ ANSWERS

1. From the West.
2. Autogyro. Loose vane rotor keeps it up. It is driven forward by a conventional motor and propeller.
3. Cumulus is a massy cloud formation.
4. A cellulose-nitrate compound. It dries rapidly with considerable shrinkage.
5. Against the wind, because the air speed is the sum of the ground speed of the plane plus the wind velocity. As a result, the run on the ground is shorter.
6. Retracted flaps that act as air brakes.
7. Belly bubble, a power-operated turret hung under the fuselage of the B-17E.
8. Pin, to afford directional stability.
9. Directional antenna, operated in conjunction with the radio compass.
10. RIGHT. The new German Focke-Wulf is powered by an air-cooled engine although heretofore German designers have been partial to liquid cooled engines.
11. WRONG. Kitty Hawk, N. C., is where the Wright brothers demonstrated their first airplane.
12. WRONG. The Mitsubishi Zero wings and fuselage are made of aluminum.
13. RIGHT. The B-26 has been used successfully as a torpedo plane.
14. WRONG. The "Thunderbolt", new Republic-built fighter, is supercharged for high altitude operation above 20,000 feet.
15. RIGHT. The air-cooled, as in the Curtiss P-40, is part of the engine cooling system.



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